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Indian Standard

METHODS OF TEST FOR NATURAL RUBBER LATEX

PART 4 DETERMINATION OF TOTAL ALKALINITY

NRL : 7

(First Revision)

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Indian Standard

METHODS OF TEST FOR NATURAL RUBBER LATEX

PART 4 DETERMINATION OF TOTAL ALKALINITY

NRL : 7

(First Revision)

0. FOREWORD

0.1 This Indian Standard (Part 4) (First Revision) was adopted by the Indian Standards Institution on 8 March 1985, after the draft finalized by the Rubber Sectional Committee had been approved by the Petroleum, Coal and Related Products Division Council.

0.2 Test methods for rubber latex had been originally covered in the following Indian Standards:

For natural rubber latex

IS : 3708 (Part 1)-1966*
IS : 3708 (Part 2)-1968†

For styrene butadiene rubber latex

IS : 4511 (Part 1)-1967‡

Since some of the test methods covered in the above standards were common, the concerned committee had decided some years ago to unify and publish a seperate series of methods of test which would be applicable to all types of latices — natural as well as synthetic. Accordingly, the following six test methods had been covered under IS : 9316.

IS : 9316 Methods of test for rubber latex:

Part 1-1979	Determination of surface tension
Part 2-1979	Determination of viscosity

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*Methods of test for natural rubber latex : Part 1 Dry rubber content, sludge content, density, total alkalinity, KOH-number, mechanical stability, volatile fatty acid number, *p*H, total nitrogen, total copper, total iron. total manganese and total ash.

†Methods of test for natural rubber latex, Part 2.

‡Methods of tests for styrene-butadiene rubber (SBR) latices: Part 1 Determination of dry polymer, *p*H, density, residual styrene, bound styrene and soap content.

Part 3-1979	Determination of coagulum content
Part 4-1979	Determination of total solids content
Part 5-1979	Drawing of samples
Part 6-1982	Determination of *p*H

0.2.1 As a result of further rethinking on the subject, it has now been decided to re-designate the test methods common to natural and synthetic rubber latices as RL series; test methods for natural rubber latex as NRL series and test methods for styrene-butadiene rubber latex as SBRL series. Consequently, test methods for rubber latex have been rationalized into the following three series:

a) IS : 9316 Unified methods of test applicable to both natural and synthetic rubber latices — RL series;

b) IS : 3708 Methods of test applicable to natural rubber latex — NRL series; and

c) IS : 4511 Methods of test applicable to styrene butadiene rubber latex — SBRL series.

0.3 The existing Indian standards under IS : 3708 (Parts 1 * and 2†), IS : 4511 (Part 1‡) and IS : 9316 (Parts 1 to 6) are being gradually replaced by separate standards under the above three series, designated by the appropriate NRL, SBRL, or RL series, respectively.

0.3.1 The methods covered under NRL : 13, NRL : 14 and NRL : 15 of IS : 3708 (Part 1)-1966 which are also under revision, have been proposed to be covered under the RL series in IS : 9316 (*under revision*).

0.4 In order to facilitate cross-reference, it has been decided to retain the original discrete NRL series numbers assigned to various test methods, in IS : 3708 (Parts 1* and 2†) in the revised parts of IS : 3708.

0.4.1 For proper referencing of the existing test methods and the new methods under revision, a statement showing corresponding methods is given in Appendix A.

0.5 In preparing the above series, the need to align the test methods with the corresponding ISO standards/DIS/DP wherever available has also been taken into account for updating the test methods. In the preparation of this standard, assistance has been derived from ISO 125-1983 'Rubber latex, natural — Determination alkalinity', issued by the International Organization for Standardization (ISO).

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*Methods of test for natural rubber latex: Part 1 Dry rubber content, sludge content, density, total alkalinity, KOH-number, mechanical stability, volatile fatty acid number, *p*H, total nitrogen, total copper, total iron, total manganese and total ash.

†Methods of test for natural rubber latex, Part 2.

‡Methods of tests for styrene-butadiene rubber (SBR) latices:
Part 1 Determination of dry polymer, *p*H, density, residual styrene, bound styrene and soap content.

0.6 In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calulated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

1. SCOPE

1.1 This standard (Part 4) prescribes a method for the determination of total alkalinity of natural rubber latex of *Hevea brasiliensis*, uncompounded and unvulcanized and subjected to some type of concentration process other than heat concentration and which may contain preservatives.

2. OUTLINE OF THE METHOD

2.1 Latex is titrated to *p*H 6·0 in the presence of a stabilizer, either electrometrically, or alternatively with methyl red as visual indicator, and its alkalinity calculated from the quantity of acid which is required.

3. APPARATUS

3.1 *p*H Meter — equipped with glass electrode and saturated calomel cell and capable of being read to 0·02 unit.

3.2 Chemical Balance

3.3 Weighing Bottle

3.4 Burette

4. REAGENTS

4.1 Emulsion Stabilizer — 5 percent (*m/m*) solution of a non-ionic stabilizer of the ethylene oxide condensate type. Before use, the *p*H of the solution shall be adjusted to a value of 6·0 ± 0·1.

4.2 Sulphuric Acid or Hydrochloric Acid — 0·1 N (*see* IS : 266-1977† and IS : 265-1976‡).

4.3 Indicator Solution — methyl red (*see* IS : 2263-1979§).

5. PROCEDURE

5.1 Take between 5 g and 10 g of the well-mixed sample in a weighing bottle fitted with a stopper. Weigh to the nearest 0·01g. To a 500-ml

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*Rules for rounding off numercial values (*revised*).

†Specification for sulphuric acid (*second revision*).

‡Specification for hydrochloric acid (*second revision*).

§Methods of preparation of indicator solutions (*first revision*).

squat beaker add 200 ml of water. Mix with water 10 ml of the stabilizer solution. Stir the water with a glass rod to distribute the stabilizer. Pour the latex into the beaker from the weighing bottle, restopper the bottle and reweigh to obtain the mass of latex added by difference. Stir to distribute the latex in the stabilizer solution. Insert the electrodes of the standardized *p*H meter and, with continual stirring, add from a burette the sulphuric acid or hydrochloric acid solution until the *p*H is reduced to a value of 6·0 ± 0·05. Add the acid drop by drop on approaching the end-point.

5.2 As an alternative to electrometric titration, use methyl red as visual indicator, taking the end-point as the colour change to pink.

NOTE — The object of the stabilizer is to prevent coagulation of the latex on addition of acid.

6. CALCULATION

6.0 Calculate the alkalinity of the latex as specified in **6.1** or **6.2** whichever is appropriate.

6.1 If the latex is preserved with ammonia, calculate its alkalinity as grams of ammonia (NH_3) per 100 g of latex, as follows:

$$\text{Alkalinity (as } NH_3) = \frac{1.7 \times N \times V}{m}$$

where

N = normality of the acid used,

V = volume in ml of acid used, and

m = mass in g of the test portion.

The results of the duplicate determinations shall not differ by more than 0·02 unit where the actual alkalinity is above 0·5 unit, or shall not differ by more than 0·01 unit where the actual alkalinity is 0·5 unit or less.

6.2 If the latex is preserved with potassium hydroxide, calculate its alkalinity in grams of potassium hydroxide per 100 g of latex, as follows:

$$\text{Alkalinity (as KOH)} = \frac{5.61 \times N \times V}{m}$$

where N, V and m are as defined in **6.1**.

The results of the duplicate determinations shall not differ by more than 0·03 unit.

APPENDIX A

(*Clause* 0.4.1)

TABLE SHOWING CORRESPONDENCE OF THE VARIOUS METHODS OF TEST COVERED IN THE EXISTING IS : 9316 (PARTS 1 TO 5)-1979, IS : 9316 (PART 6)-1982, IS : 3708 (PART 1)-1966, IS : 3708 (PART 2)-1968, IS : 4511 (PART 1)-1967 *WITH* THE REVISION/PROPOSED REVISION OF IS : 9316, IS : 3708 AND IS : 4511

Existing Test Methods			Proposed Revision		Remarks
Test Method	IS : No.	Part (Series)	IS : No.	Series	
(1)	(2)	(3)	(4)	(5)	(6)
RL SERIES					
Determination of surface tension	IS : 9316-1979	Part 1	IS : 9316	Part 1 (RL : 1)	Under Revision
Determination of viscosity	IS : 9316-1979	Part 2	IS : 9316	Part 2 (RL : 2)	
Determination of coagulum content	IS : 9316-1979	Part 3	IS : 9316	Part 3 (RL : 3)	
Determination of total solids content	IS : 9316-1979	Part 4	IS : 9316	Part 4 (RL : 4)	
Drawing of samples	IS : 9316-1979	Part 5	IS : 9316	Part 5 (RL : 5)	
Determination of *p*H	IS : 9316-1982	Part 6	IS : 9316	Part 6 (RL : 6)	
Determination of total copper	IS : 3708-1966	Part 1 (NRL : 13)	IS : 9316	Part 7 (RL : 7)	
Determination of total iron	IS : 3708-1966	Part 1 (NRL : 14)	IS : 9316	Part 8 (RL : 8)	
Determination of total manganese	IS : 3708-1966	Part 1 (NRL : 15)	IS : 9316	Part 9 (RL : 9)	
NRL SERIES					
Determination of dry rubber content	IS : 3708-1966	Part 1 (NRL : 1)	IS : 3708	Part 1 (NRL : 1)	
Determination of sludge content	IS : 3708-1966	Part 1 (NRL : 5)	IS : 3708	Part 2 (NRL : 5)	
Determination of density	IS : 3708-1966	Part 1 (NRL : 6)	IS : 3708	Part 3 (NRL : 6)	
Determination of total alkalinity	IS : 3708-1966	Part 1 (NRL : 7)	IS : 3708	Part 4 (NRL : 7)	
Determination of KOH-number	IS : 3708-1966	Part 1 (NRL : 8)	IS : 3708	Part 5 (NRL : 8)	
Determination of mechanical stability	IS : 3708-1966	Part 1 (NRL : 9)	IS : 3708	Part 6 (NRL : 9)	

Existing Test Methods Test Method (1)	IS : No. (2)	Part (Series) (3)	Proposed Revision IS : No. (4)	Series (5)	Remarks (6)
volatile fatty	IS : 3708-1966	Part 1 (NRL : 10)	IS : 3708	Part 7 (NRL : 10)	Under Revision
total nitrogen	IS : 3708-1966	Part 1 (NRL : 12)	IS : 3708	Part 8 (NRL : 12)	
total ash	IS : 3708-1966	Part 1 (NRL : 16)	IS : 3708	Part 9 (NRL : 16)	
boric acid	IS : 3708-1968	Part 2 (NRL : 17)	IS : 3708	Part 10 (NRL : 17)	
magnesium	IS : 3708-1968	Part 2 (NRL : 18)	IS : 3708	Part 11 (NRL : 18)	
dry polymer	IS : 4511-1967	Part 1 (SBRL : 1)	IS : 4511	Part 1 (SBRL : 1)	
density	IS : 4511-1967	Part 1 (SBRL : 6)	IS : 4511	Part 2 (SBRL : 6)	
of residual le unsaturates)	IS : 4511-1967	Part 1 (SBRL : 8)	IS : 4511	Part 3 (SBRL : 8)	
bound styrene	IS : 4511-1967	Part 1 (SBRL : 9)	IS : 4511	Part 4 (SBRL : 9)	
soap content	IS : 4511-1967	Part 1 (SBRL : 10)	IS : 4511	Part 5 (SBRL : 10)	

NRL SERIES

Determination of
acid number
Determination of
Determination of
Determination o
Determination o

SBRL SERIES

Determination o
Determination o
Determination
styrene (volat
Determination o
Determination o

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INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2